REVISION OF THE CRUSTACEA OF THE GENUS LEPIDOPA.

By James E. Benedict,

Assistant Curator of Marine Invertebrates.

No group of small nonparasitic animals is more inseparably and picturesquely associated with the environment in which the greater numbers live than are the members of the super-family Hippoidea, of which the sand bug, known as *Hippa talpoida*[a] since the time of Say, is the best known representative on the east coast of the United States. Members of this family are occasionally found even as far north as Cape Cod. They live in the sand on open beaches, which have been said to be the most barren of places for a collector with the exception of a desert. Nevertheless a walk along the shore is always interesting. The bleached and broken tests of sea urchins, beach-worn shells of mollusks which have lived beyond the surf lines, and the fragments of innumerable things which the waves cast up, momentarily attract the attention. Living things that occur are but few, and usually well-known species. One may expect to see an occasional swimming crab protecting itself from the surf and perhaps from the collector, by settling back into the sand nearly or quite out of sight, or a running crab hastening to its burrow, or if cut off from this retreat, plunging into the surf out of reach of scoop nets. The long rows of partially dried sea-weed often shelter Amphipods, Isopods, and shore insects, and digging along the water's edge brings to light a few small Annelids and Synaptas, but the hunt alongshore with shovel and sieve where the waves are pounding results usually in finding little but Hippids, which scuttle about the sieve in the vain effort to escape, or if a sieve is not at hand, and the contents of the shovel have been spread upon the beach, quickly disappearing in the sand only to be brought back by a plunge of the hand. But in the warmer American waters, among the Hippids an occasional *Albunea* or *Lepidopa* will be found, seemingly living under the same conditions as the Hippids, though differently fitted for such conditions. Very few specimens of the

[a] Now *Emerita talpoida*. Bull. U. S. Fish Com., II, 1900, p. 138.

Albuneids seem to be present at one time, and the question naturally arises, is this their normal proportion, or do they occur in greater numbers in some more favored locality, perhaps farther out where the sands are not always in motion, and where they would be able to use more deliberately, in feeding, the hands which have been altogether denied their relatives, the Hippids; or do they live deeper in the sand, where their long antennulæ may not only warn them of the presence of prey, but keep the way open and even entice the victim within reach of the strong hands? The answer to this question must be deferred until collectors have recorded more careful and extended observations; and it may not be out of place to here suggest that one reason for the scarcity of individuals is that collectors, having quickly obtained a sufficient number of Hippids for their purposes, do not prolong the search, and so miss a chance to obtain the rarer Albuneids. Between these forms striking differences will be observed. The Hippids are shuttle-shaped, while the Albuneids, except in the case of *Blepharipoda*, are broader across the front than anywhere else. To some difference in habit is possibly due the great difference in the eyes. Those of the Hippids are on slender almost thread-like stalks, while those of the Albuneids are remarkable for the peculiar and diverse shapes of the stalks which furnish characters that may be used not only to distinguish the genera, but to quite an extent, even the species in a genus. In the genus *Albunea* they are flattened, elongated, and in most species acutely triangular in shape, with a small cornea at the apex. In the genus *Lepidopa* they are scale-like, and in some species almost rectangular, while the cornea, if the small speck can be so called, may be situated either on the terminal or lateral margin. It is hard to understand just what is the function of the broad scale-like stalk. The speck which serves for the eye can hardly do more than distinguish light from darkness. In the genera having mere eyespecks on a scale-like stalk the antennulæ are extraordinarily developed. This forces another question upon us: Is not this a case of one sense organ having been developed at the expense of or in compensation for another, for the antennulæ are sense organs of no slight power, being from two to five times the length of the carapace—straight, stiff, and well provided with hairs which are probably sensory. These organs must be more useful than eyes to an animal living submerged in the sand in the situations where they have been found. *Blepharipoda* has yet a different eyestalk, slender as in the Hippids, but jointed in the middle.

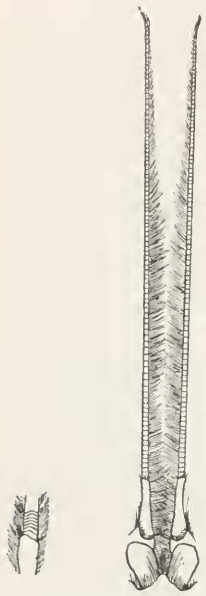

FIG. 1.—ANTENNULAE OF LEPIDOPA MYOPS, × 1.

The Hippidæ and the Albuneidæ make up the super-family Hippoidea of the Macrura Anomalia.

In this paper four species are described as new, and, though the material is scanty, the localities from which the specimens were obtained are separated by long distances. Of the seven species now included in the genus *Lepidopa* six are represented in the collections of the U. S. National Museum and one in those of the museum of Union University, Schenectady, New York.

GENUS LEPIDOPA Stimpson.

Lepidopa Stimpson, Proc. Acad. Nat. Sci. Phila., 1858, p. 230.
Lepidops Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, April, 1860, p. 241.—Miers, Revision of the Hippidea, Jour. Linn. Soc. Lond., XIV, Oct., 1878, p. 331.

The Albuneids of this genus may be immediately recognized by the very long, stiff lashes of the antennules or middle antennæ in connection with the broad scale-like stalks which range in form from ovate to quadrate. The carapace in all species is shield shaped, the surface is but little broken by lines.

The characters relied upon to distinguish the species are believed to be those least likely to vary.

KEY TO THE SPECIES OF THE GENUS LEPIDOPA

a'. Eye-stalks ovate.
  b'. With lobe between the central points of the front ..... *venusta*, p. 892
  *b*². Without lobe between the points of the front ..... *websteri*, p. 892
*a*². Eye-stalks subrectangular.
  b'. Cornea on the frontal margin of the eye-stalk very small ..... *myops*, p. 892
  *b*². Cornea on the outer margin.
    c'. Antero-lateral angle of eye-stalk produced much beyond the side, anterior margin rounded ..... *deamæ*, p. 893
    *c*². Antero-lateral angle not produced much, if any, beyond the line of the side, anterior margin straight or very slightly concave.
      d'. Inner distal angle of the eye-stalk more rounded than the outer. *scutellata*, p. 894
      *d*². Outer distal angle of the eye-stalk more rounded than the inner.
        e'. Margin between the central and lateral teeth of the front is occupied by a sinus divided by a lobe into nearly equal parts ..... *mearnsi*, p. 895
        *e*². Margin between the central and lateral points occupied by the usual ocular sinus, the lobe not forming a second sinus between it and the lateral teeth of the front ..... *richmondi*, p. 895

LEPIDOPA VENUSTA Stimpson.

Lepidopa venusta STIMPSON, Proc. Acad. Nat. Sci. Phila., 1858, p. 230 (without description); Ann. Lyc. Nat. Hist. of New York, VII, p. 79.
Lepidops venusta MIERS, Jour. of Linn. Soc. of London, XIV, p. 332.

Eyes oblong, broadest about the posterior third, narrowing toward the cornea, which is terminal and very small, barely visible from above. From below, under a lens, it is shown as a black speck with a little dark streak running to the bottom of the peduncle.

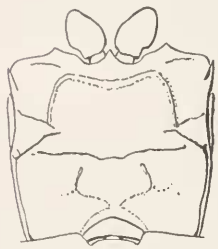

FIG. 2.—LEPIDOPA VENUSTA, × 2.

The ocular sinus is separated from the spine behind the antenna by a slight lobe in all specimens. Between the spine and the antero-lateral angle the outline is slightly concave. The front and lateral projections are equally advanced.

Length of carapace of largest specimen, 11 mm.; breadth, 14 mm Savanilla, U. S. Colombia; collected by the U. S. Fish Commission steamer *Albatross;* three specimens.

LEPIDOPA WEBSTERI, new species.

Lepidopa venusta, KINGSLEY, Proc. Acad. Nat. Sci. Phila. for 1879 (Part pub. March 9, 1880), p. 410.

In comparing the single specimen referred to by Mr. Kingsley with *Lepidopa venusta*, it is found to be very closely related, but yet distinct. It differs in having the lateral teeth of the front closer to the rostral tooth, while in *L. venusta* they are closer to the spines of the antero-lateral angles; the lateral teeth of *L. websteri* are also more produced, and the lobe between the base of the rostral tooth and the lateral teeth has almost disappeared from this species, while prominent in *L. venusta*. The eye stalks are in a general way only like those of *L. venusta;* they are not so long in proportion and are not contracted as much near the apex. The specimen can hardly be said to have an eye speck; a dark line on the lower surface may serve to distinguish light from darkness.

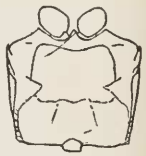

FIG. 3.—LEPIDOPA WEBSTERI, × 2.

The color of this species, as *L. venusta*, also is iridescent.

The carapace is 7 mm. in length and 9 mm. in breadth.

Named for the collector, Prof. H. E. Webster.

The type belongs to Union University, Schenectady, New York, and was taken on the beach near Fort Macon, North Carolina.

LEPIDOPA MYOPS Stimpson.

Lepidops myops STIMPSON, Ann. Lyc. Nat. Hist. New York, VII, 1862, p. 241.—MIERS, Jour. of the Linn. Soc. of London, Zool., XIV, 1879, p. 333, pl. v, fig. 16.

The eyes are broad and very broadly rounded at both angles, the inner distal angle is, however, more evenly rounded than the outer,

which is slightly produced beyond the inner. The eye speck is on the distal margin near the outer angle and the sinus occupied by it could hardly be distinguished with a lens, were it not for the slight coloration remaining.

The front is tridentate. The lateral teeth are acute, while the median tooth is blunt and evenly rounded, situated posterior to the line of the lateral points just 1 mm., in the specimen described. Between the deepest part of the ocular sinus is a broad lobe. Between the lateral point and the antero-lateral angle the margin is deeply concave.

FIG. 4.—LEPIDOPA MYOPS, ×1½.

The carapace of this species, like that of scutellata, has a broad, rather depressed ridge running along the median line. The post-branchial area has a group of from 8 to 10 large punctures.

The specimen from which the foregoing description was drawn was obtained by Dr. E. A. Mearns, U. S. A., off San Diego, California.

Type.—No. 28661, U.S.N.M.

LEPIDOPA DEAMÆ, new species.

The eye-stalks of this species are broadest near the anterior end. The inner and distal margins are about equally arcuate and form a slightly obtuse angle where they meet. The anterior exterior angle of the stalk is well rounded; behind this angle the eye spot is well indented. From this place the stalk narrows rapidly to its base.

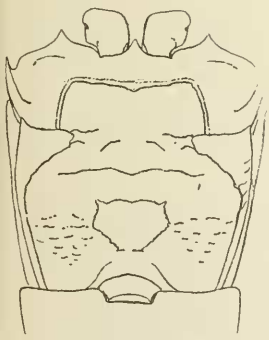

FIG. 5.—LEPIDOPA DEAMÆ, NATURAL SIZE.

The median tooth of the front is advanced to a point nearly in line with the lateral teeth. From the rostral tooth the margin runs backward, making an ocular sinus evenly concave at its inner half; from this point it is straight and almost transverse to the notch where it meets the sigmoid margin and the lateral tooth of the front. From the lateral tooth to the spine at the antero-lateral angle the margin is sigmoid, an exact copy of the sigmoid outline of the margin between the point and the eye sinus, but very much larger.

The carapace is convex transversely, straight longitudinally.

As in scutellata, the median line is raised into a broad carina, triangular in cross section; this is by far the largest *Lepidopa* in the collection. It is 35 mm. broad in front, is 32 mm. long measured on the middle line from the apex of the rostrum to the posterior margin of the carapace. Named for the collector, Mrs. Clarence C. Deam, of Bluffton, Indiana, who obtained the specimen from Salina Cruz, Gulf of Tehuantepec, Mexico.

Type.—No. 26170 U.S.N.M.

LEPIDOPA SCUTELLATA Stimpson.

?Hippa scutellata Fabricius, Ent. Syst., II, 1793, p. 474.

?Albunea scutellata Desmarest, Consid. sur le Crust., 1825, p. 173.—M. Edwards, Hist. Nat. des Crust., II, 1837, p. 204, pl. xxi, figs. 9–13.—Gibbes, Proc. American Assoc., 1850, p. 187.—Dana, U. S. Expl. Exp., XIII, 1852, p. 406.

Lepidopa scutellata Stimpson, Proc. Acad. Nat. Sci. Phila., 1858, p. 230; Ann. Lyc. Nat. Hist., New York, VII, Mar., 1859, p. 79.

Lepidops scutellata Miers, Jour. Linn. Soc. Lond., XIV, Oct., 1878, p. 332.

The eye-stalks are nearly rectangular, a little longer than wide. The anterior margin is slightly concave and under a lens is seen to be armed with denticles. The eye-specks are situated on the outer margin just posterior to the rounded portion of the distal angle. These specks are much more prominent in this and other species with rectangular eye-stalks than in species with ovoid stalks. The lateral teeth of the anterior margin are a little more advanced than the middle or rostral tooth, and are placed nearer to the spine of the anterolateral angle than to this tooth. The margin of the front is sigmoid between the apex of the lateral teeth and the bottom of the ocular sinus. At this point it meets the concave line which forms the margin of the rostral tooth; at the point where the lines meet there is a very small notch. The carapace is broader than long, straight on the median line, and strongly curved laterally.

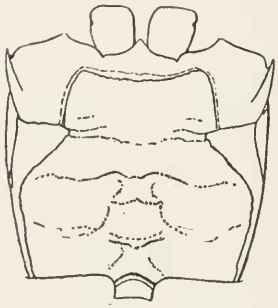

Fig. 6.—Lepidopa scutellata, $\times \frac{1}{2}$.

The carapace of a female from Pensacola, Florida, measures 16.5 mm. long and 19.5 mm. wide. The eye-stalks are 4 mm. long and 3.4 mm. wide.

An examination of the stomach of a specimen taken near Morris Cut, opposite Miami, Florida, disclosed the setæ of Annelids, the skin of a very small Synapta with some anchor plates still present, and parts of the flagellæ of some small crustacea.

The type locality of the species called *Albunea scutellata* by the earlier authors will probably never be known. When Stimpson erected the genus *Lepidopa* by separating *Albunea*, he placed in it two species from the island of St. Thomas, West Indies. The species with the more rectangular eye-stalks he very properly identified with *Albunea scutellata* of Desmarest, Edwards, and others. This identification he could not have verified nor can we at this time unless the types are extant. As the matter stands the island of St. Thomas can be recognized as the type locality of the species. The specimens in the National Museum do not come from localities nearer St. Thomas than Florida, and it follows that the species here described and figured for *L. scutellata* may prove to be new.

LEPIDOPA MEARNSI, new species.

The eye-stalks are almost rectangular. The inner distal angle of the stalk is much less rounded than the outer. The anterior margin is very slightly concave. The eye-speck or cornea is situated on the side just behind the rounded portion of the angle. The three teeth of the front extend forward to nearly the same line, the rostral tooth is, however, a trifle shorter. The sinus behind the eye is divided by a lobe into two nearly equal parts.

Fig. 7.—Lepidopa mearnsi, × 4.

This species is more nearly related to *L. richmondi* than to any other. It is represented by one specimen in very bad condition, the front and eye stalks are, however, intact.

The unique type-specimen is labeled "West coast of Central America."

Type.—No. 26171, U.S.N.M.

LEPIDOPA RICHMONDI, new species.

The character of the eyes is almost identical with *L. mearnsi*, except that the eyes of this species are proportionally slightly smaller, the distal margin is more nearly straight and the inner margin is slightly more arcuate. The median projection of the front is a little posterior to the line of the projection of the teeth; this alters the character of the sinus behind the eye and eliminates the slight sinus found behind the antennula in *L. mearnsi*. The margin between the ocular sinus and the lateral tooth of the front is transverse. At first sight the effect of the lateral tooth rising beyond the margin is to give it the appearance of a double sinus as in *L. mearnsi*, but a careful examination shows that this is erroneous, except in the manner that a sinus always exists at the side of a spine or tooth-like projection. The carapace is arcuate but slightly flattened on the sides, forming a low ridge on the median line. Longitudinally the carapace is straight. The flagellum of the *richmondi* has 8 joints.

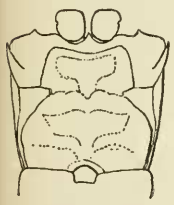

Fig. 8.—Lepidopa richmondi, × 2½.

Distance between lateral points of the front is 5 mm. Size of eye scales is 1.5 mm. by 1.5 mm.

Locality.—A single specimen from Greytown, Nicaragua, collected by Dr. C. W. Richmond, for whom it is named.

Type.—No. 25828, U.S.N.M.